

For Official Use Only



IMAAC

**Interagency Modeling and
Atmospheric Assessment Center**

Real World

***Chemical plant explosion and fire in
Geismar, Louisiana***

13JUN2013 1750Z

RFI – 0418U_update1

13JUN2013

Requestor: Martin Waysom

Distribution authorized to U.S. Government agencies and
their contractors for administrative/operational use.

Date: 06/13/2013

Other requests for this document shall be referred to:

Defense Threat Reduction Agency
8725 John J. Kingman Rd, MS 6201
Fort Belvoir, VA 22060-6201

For Official Use Only



For Official Use Only

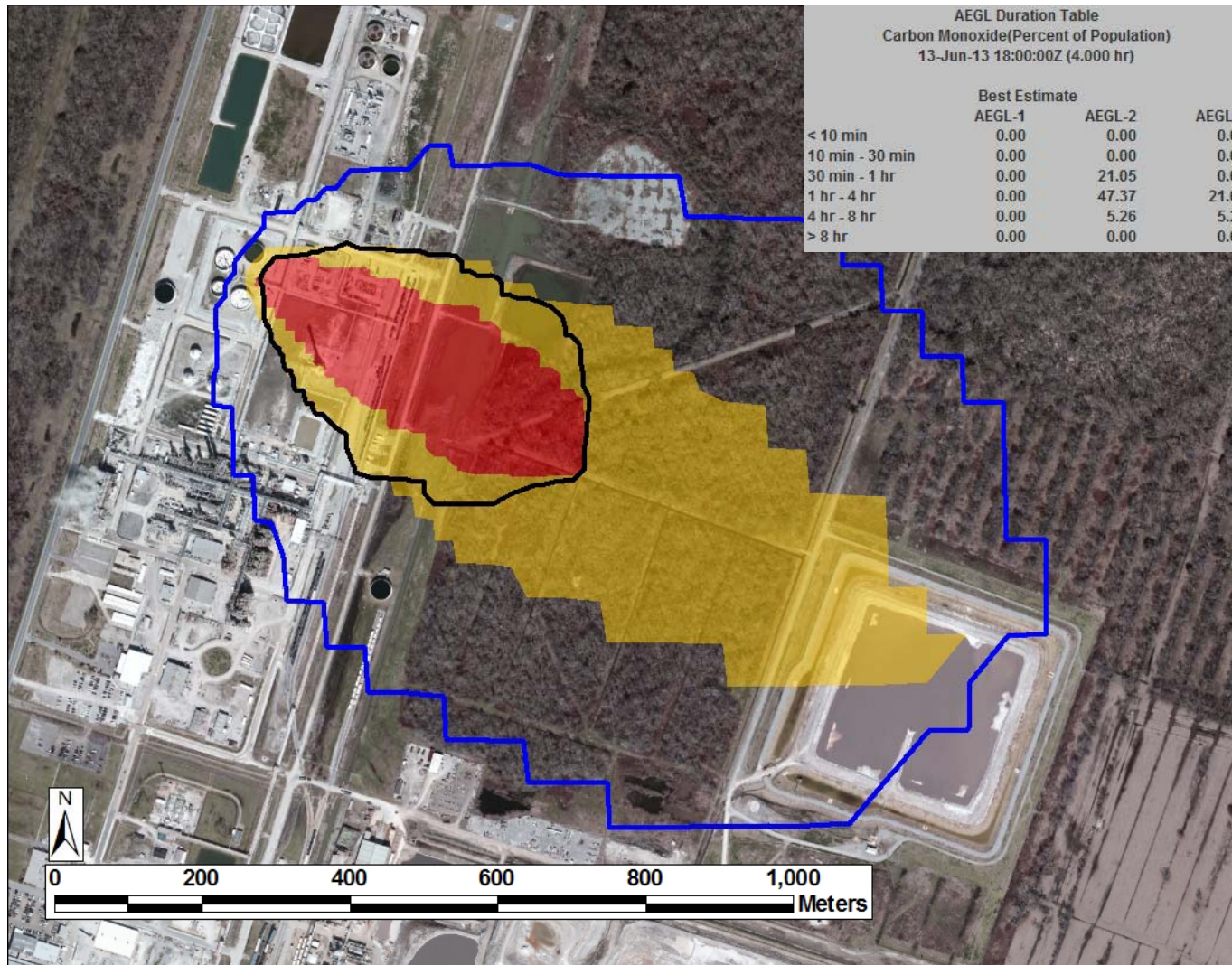
Summary

- Known Information: Explosion and fire occurred at 0900 local time at Williams Olefins Plant, Geismar, LA
- Modeling Assumptions: The combustion of ethylene propylene yields carbon dioxide and water. Carbon monoxide is modeled here as a combustion hazard instead of carbon dioxide. Due to the limited nature of information about the combustion products, SOOT is also modeled here based on EPA exposure limits.



For Official Use Only

Carbon Monoxide – Far View – Initial Response



AEGL Duration Table
Carbon Monoxide(Percent of Population)
13-Jun-13 18:00:00Z (4.000 hr)

	Best Estimate		
	AEGL-1	AEGL-2	AEGL-3
< 10 min	0.00	0.00	0.00
10 min - 30 min	0.00	0.00	0.00
30 min - 1 hr	0.00	21.05	0.00
1 hr - 4 hr	0.00	47.37	21.05
4 hr - 8 hr	0.00	5.26	5.26
> 8 hr	0.00	0.00	0.00

Carbon monoxide : Acute Exposure Guideline Levels (FINAL)
13-Jun-13 18:00:00Z (4.000 hr)
"Best Estimate" - Mean Contours

	Value	In contour population
Death Possible	3.0	5
Injury Possible	2.0	14
Worst Case (w/wx uncertainty)		
	Value	In contour population
10% Death Possible	3.0	8
10% Injury Possible	2.0	33

This quick response used a weather prediction model; and was not coordinated with other IMAAC participants. Coordination will follow, and product will be updated as needed.

FACTS

Name of location: Geismar, LA
Location: 30.235833° N / 91.050556° W
Event Time: 0900 local (1400Z), 13JUN2013
Type: Carbon Monoxide
Amount: 750,000 lbs
Dissemination: Explosion w/ instantaneous release
Weather: 12km NAM
Model: HPAC 5.1
Static Population Estimates:
LandScan 2011

13JUN2013 1750Z

For Official Use Only



For Official Use Only

Acute Exposure Guideline Levels (AEGLs) – FINAL

Death Possible (AEGL-3): The concentration in air of a substance at or above which it is predicted that the general population could experience life-threatening health effects or death.

Injury Possible (AEGL-2): The concentration in air of a substance at or above which it is predicted that the general population could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

Threshold (AEGL-1): Note for various hazards, threshold (AEGL-1) values are not published and/or not appropriate based on biological effects

EPA: "Acute* Exposure Guideline Levels (AEGLs), are intended to describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills, or other catastrophic exposures. *Definition: Acute exposures are single, non-repetitive exposures for not more than 8 hrs"

FINAL AEGL Values: When concurrence by the NRC/AEGL Subcommittee is achieved, the AEGL values are considered "final" and published by the NRC. Final AEGL values may be used on a permanent basis by all federal, state and local agencies, and private organizations.

Notes: In accordance with EPA guidelines, the published AEGL times are at 10 min, 30 min, 1 hr, 4 hr and 8 hr only. Using these published guidelines from the EPA, DTRA developed HPAC 5.0 to plot human effects in a time weighted manner that better estimates the AEGL effects. For exposure times below 10 min AEGL values are extrapolated based on existing data fit. For most releases very short times tend to dominate AEGL exposure and therefore extrapolated data are dominant. Numerical figures are based upon a population database (LandScan). LandScan is based on the 2010 census for the U.S. (other nations vary), overhead imagery, geo-economic, and other observable data and was updated in 2011. Population is assumed static for calculations. The population numbers next to associated hazard levels are the people contained within the entire contour based, **based upon average day and night** time LandScan 2011 data. **Also available are the average day or night** time LandScan 2011 data. For planning purposes, estimates are assumed to be accurate within +10/-5%. Validation testing indicates agreement within 20% for select examined areas. The population data will not predict major shifts in personnel such as relocations (i.e.: religious pilgrimages, refuges, evacuations), events (i.e.: inaugurations, Olympics), or other population shifts. In such cases the population database needs to be updated to reflect actual conditions.

Acute Exposure Guideline Levels (FINAL)		
"Best Estimate" - Mean Contours		
	Value	In contour population
Death Possible	3.0	Values Vary
Injury Possible	2.0	Values Vary
Worst Case (w/wx uncertainty)		
	Value	In contour population
10% Death Possible	3.0	Values Vary
10% Injury Possible	2.0	Values Vary

90% confidence level that an AEGL-3 or AEGL-2 outcome is possible, based on atmospheric effects and weather uncertainty.



For Official Use Only

Acute Exposure Guideline Limits – Durations

The percentages displayed indicate what percentage of the total population affected at any AEGL level is affected by the AEGL level and time duration interval specified.

Acute Exposure Guideline Limits (AEGL) are defined for a particular chemical as airborne concentrations experienced* for durations of 10 minutes, 30 minutes, 1 hour, 4 hours and 8 hours. Beyond 8 hours, AEGL values are compared to the 8 hour definitions (if applicable).

Since AEGL values are a measure of both concentration and time, a release of a particular chemical will, over the indicated time, yield a spectrum of values of dosages that can be classified under one of the three AEGL levels for one of the time intervals displayed in table pictured to the right. In this example, 37.23% of the population is exposed to AEGL-1 levels for less than 10 minutes, 11.48% of the population is exposed to AEGL-1 levels for 10-30 minutes, etc.

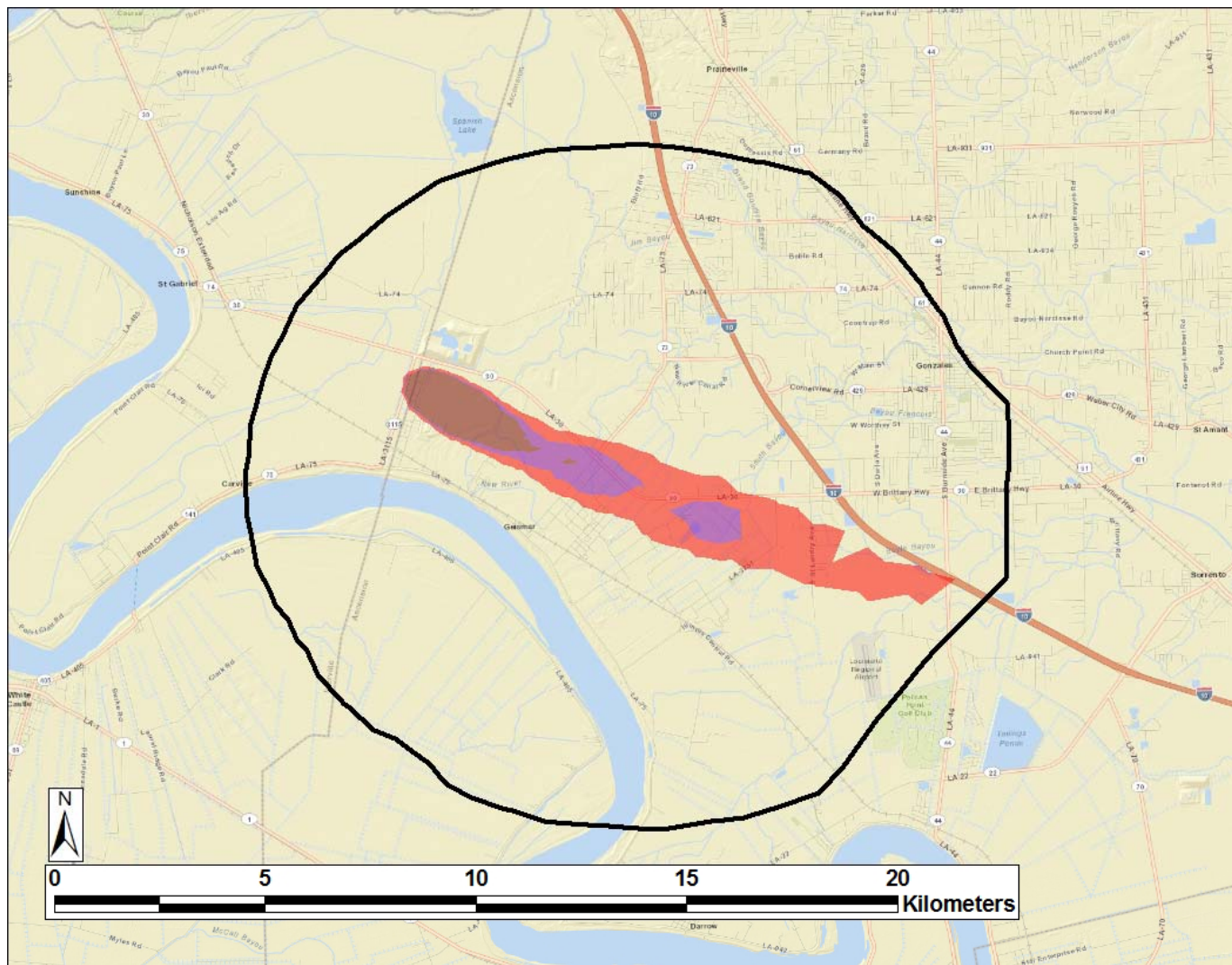
AEGL Duration Table			
Nitric Acid (Percent of Population)			
21-Nov-12 20:45:00Z (7.000 hr)			
Best Estimate			
	AEGL-1	AEGL-2	AEGL-3
< 10 min	37.23	2.89	0.50
10 min - 30 min	11.48	2.41	0.60
30 min - 1 hr	12.62	3.49	0.99
1 hr - 4 hr	20.50	5.41	1.82
4 hr - 8 hr	0.02	0.02	0.02
> 8 hr	0.00	0.00	0.00

Areas in red boxes will vary from incident to incident – above is example for illustration purposes only



For Official Use Only

Soot – H + 1 – Initial Response



Soot : EPA 10um Particulate Exposure Criteria 13-Jun-13 15:00:00Z (60.000 min)		
Mean Area		
	ug/m3	In contour population
 Hazardous	425.0	70
 Very Unhealthy	355.0	251
 Unhealthy	255.0	1,133
Area of Concern		
	ug/m3	In contour population
 Unhealthy	255.0	35,745

This quick response used a weather prediction model; and was not coordinated with other IMAAC participants. Coordination will follow, and product will be updated as needed.

FACTS

Name of location: Geismar, LA
 Location: 30.235833° N / 91.0505564° W
 Event Time: 0900 local (1400Z), 13JUN2013
 Type: Soot
 Amount: 7.74kg/sec
 Dissemination: Explosion w/ instantaneous release
 Weather: 12km NAM
 Model: HPAC 5.1
 Static Population Estimates:
 LandScan 2011

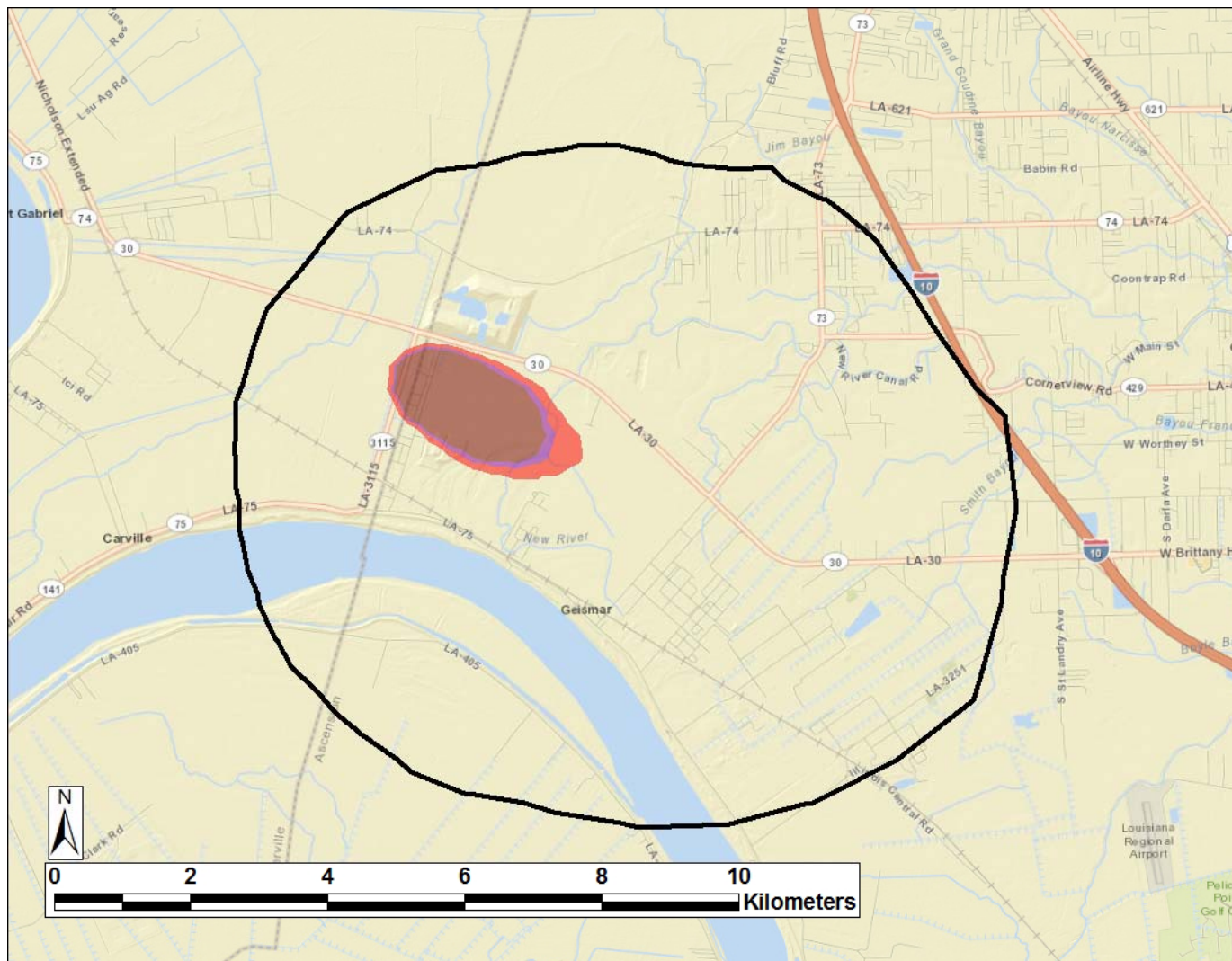
13JUN2013 1750Z

For Official Use Only



For Official Use Only

Soot – H + 4 – Initial Response



Soot : EPA 10um Particulate Exposure Criteria 13-Jun-13 18:00:00Z (4.000 hr) Mean Area		
	ug/m3	In contour population
 Hazardous	425.0	82
 Very Unhealthy	355.0	91
 Unhealthy	255.0	108
Area of Concern		
	ug/m3	In contour population
 Unhealthy	255.0	8,449

This quick response used a weather prediction model; and was not coordinated with other IMAAC participants. Coordination will follow, and product will be updated as needed.

FACTS

Name of location: Geismar LA
 Location: 30.235833° N / 91.0505564° W
 Event Time: 0900 local (1400Z), 13JUN2013
 Type: Soot
 Amount: 7.74kg/sec
 Dissemination: Explosion w/ instantaneous release
 Weather: 12km NAM
 Model: HPAC 5.1
 Static Population Estimates:
 LandScan 2011

13JUN2013 1750Z

For Official Use Only